General Chemistry Chapter 1 Pre-Test

Essays

1.) (45 pts total, 5 pts each) Briefly answer each of the following essay questions.

a) What is a hypothesis? What is an important determinant of a good hypothesis? Describe the transition from hypothesis to theory.

Hypothesis- an explanation / educated guess
A good hypothesis must be testable
IF a hypothesis survives years of scrutiny from different scientists, it merges without other explanations To form a theory.

b) What is the difference between a substance and a mixture? Give an example of each.

c) What is the difference between a homogeneous mixture and a heterogeneous mixture? Give an example of both.

d) What are the three states of matter? Describe the three states of matter with respect to the proximity and movement of particles.

e) What is the fundamental difference between a chemical and physical property? Give at least one example of both.

f) What is the difference between an extensive property and an intensive property? Provide examples of each. Which presents a better way to identify a substance?

g) What is the difference between mass and weight?

h) What does temperature actually measure?

i) What is the basis of the celsius temperature scale? What is the basis of the kelvin temperature scale?

2.) (9 pts total, 1 pts each) Complete the following table

Base Quantity	Name of Unit	Symbol
length	meter	m
mass	kilogram	k
time	second	s
temperature	kelvin	K
amount of substance	mole	mol

3.) (12 pts total, 4 pts each) Solve each of the following density problems.

a) If the density of a compound is 8.62 g/mL and the volume is 12.2 mL, find its mass? (Be mindful of significant digits)

$D = \frac{M}{V}$ ✓ ✓

$M = VD = (8.62\ g/mL)(12.2\ mL) =$

$= 105.164\ g$ → **105 g**

b) If the volume of a compound is 84.3 mL and the mass is 36.8 g, what is the density of the compound? (Be mindful of significant digits)

$D = \frac{M}{V}$ ✓ ✓

$D = \frac{36.8\ g}{84.3\ mL} = 0.4602\ g/mL$

0.460 g/mL

c) If the mass of a compound is 48.7 g and its density is 13.6 g/mL, what is the volume of the sample? (Be mindful of significant digits)

$V(D) = \left(\frac{M}{V}\right)V$

$\frac{VD}{D} = \frac{M}{D}$

$V = \frac{M}{D} = \frac{48.7\ g}{13.6\ g/mL} = 3.5808\ mL$

3.58 mL

4.) (16 pts total, 4 pts each) Convert the following temperatures:

a) 350 K into °C (Be mindful of significant digits)

$K - 273 = C$

$C + 273 = K$

$350 - 273$

$350 - 273 = 77$

$350 - 273 = 77\ °C$

b) 104 °F into °C (Be mindful of significant digits)

$F - 32 = \frac{9}{5}C$

$+32 \quad +32$

$F = \frac{9}{5}C + 32$

$\frac{5}{9}(104 - 32)$

$\frac{5}{9}(72) = 40\ °C$

Freeze 180° Boil

F: 32°F — 212°F

C: 0°C — 100°C

100

$\frac{180}{100} = \frac{9}{5}$

$\frac{180 \div 20}{100 \div 20} = 1\ °C$

c) 85.0 °C into °F (Be mindful of significant digits)

$\frac{9}{5}(85.0\ °C) + 32 =$

$9(17.0\ °C) + 32 = 185\ °F$

d) 53 °C into K (Be mindful of significant digits)

$53°C + 273 = 326\ K$

$212 \quad \frac{9}{5}$

$(F - 32)\frac{5}{9} = C$

$(180)(\frac{5}{9}) \quad (20)(5) = 100$

5.) (18 pts total, 6 pts each) Use your knowledge of dimensional analysis and life to answer the following related questions. **Write your answers in scientific notation.**

a) The longest home run hit in major league baseball this season was 486 feet. Approximately how many centimeters did the ball travel?

$(1\ ft = 12\ in) \quad (1\ in = 2.54\ cm)$

$486\ ft * \frac{12\ in}{1\ ft} * \frac{2.54\ cm}{1\ in} = 14\,813.28\ cm$

$1.48 * 10^{4}\ cm$

b) According to its website, Netflix contains approximately 125,000,000 hours of programming at any given time. How many years would it take an individual to watch the current Netflix library of content?

$$125{,}000{,}000\ \text{hrs} \times \frac{1\ \text{day}}{24\ \text{hr}} \times \frac{1\ \text{yr}}{365\ \text{day}} = 14{,}269\ \text{yrs}$$

$$14{,}300 \rightarrow 1.43 \times 10^{4}\ \text{yrs}$$

c) Nate has a problem. Recently, Nate (and the rest of the country) discovered the Popeye's chicken sandwich. According to nutritional data offered on the website, a chicken sandwich and fries combo meal contains 1004 calories. While Nate wants to fend off excess weight gain until the holiday season, he cannot help but eat five of these combo meals a day. If he burns 363 calories for every 30 minutes of running, how long will he need to run every day to keep his slim physique?